5STP 27H2801

Old part no. TV 989-2700-28

Phase Control Thyristor

Properties

- High operational capability
- Possibility of serial and parallel connection

Applications

- Controlled rectifiers
- AC drives

Key Parameters

V_{DRM}, V_{RRM}	=	2 800	V
I_{TAVm}	=	2 670	A
I_{TSM}	=	43 000	A
V_{TO}	=	1.039	V
r_T	=	0.127	mΩ

Types

	V_{RRM}, V_{DRM}
5STP 27H2801	**2 800 V**
5STP 27H2601	**2 600 V**
Conditions:	T_j = -40 ÷ 125 °C, half sine waveform, f = 50 Hz

Mechanical Data

F_m	Mounting force	50 ± 5	kN
m	Weight	0.93	kg
D_S	Surface creepage distance	36	mm
D_a	Air strike distance	15	mm
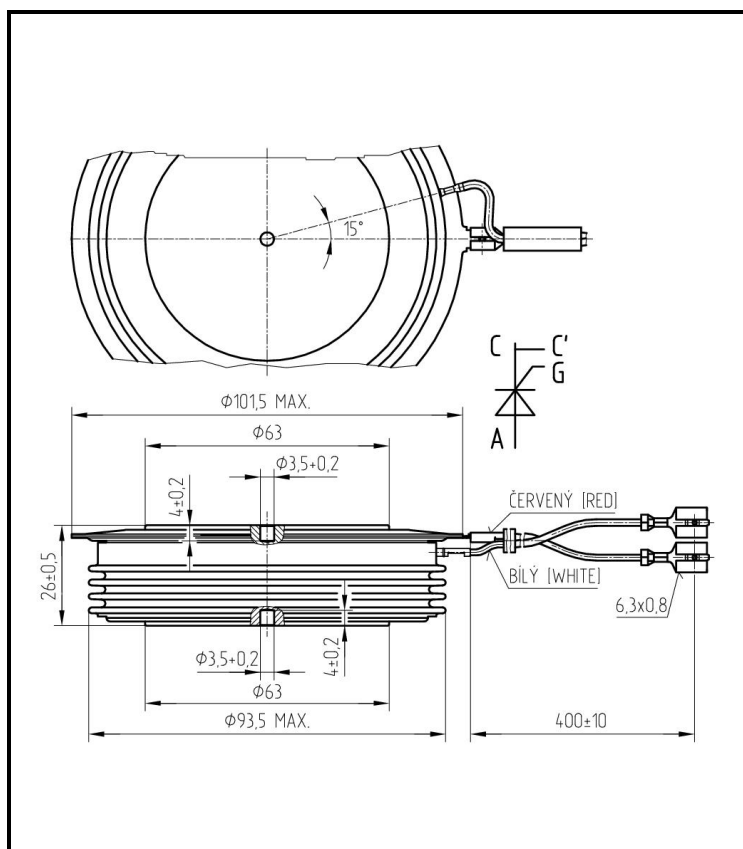
Fig. 1   Case

Maximum Ratings			Maximum Limits	Unit
V_{RRM} V_{DRM}	Repetitive peak reverse and off-state voltage $T_j = -40 \div 125\ °C$	5STP 27H2801 5STP 27H2601	2 800 2 600	V
I_{TRMS}	RMS on-state current $T_c = 70\ °C$, half sine waveform, $f = 50\ Hz$		4 193	A
I_{TAVm}	Average on-state current $T_c = 70\ °C$, half sine waveform, $f = 50\ Hz$		2 670	A
I_{TSM}	Peak non-repetitive surge half sine pulse, $V_R = 0\ V$	$t_p = 10\ ms$ $t_p = 8.3\ ms$	43 000 45 900	A
I^2t	Limiting load integral half sine pulse, $V_R = 0\ V$	$t_p = 10\ ms$ $t_p = 8.3\ ms$	9 250 000 8 740 000	A^2s
$(di_T/dt)_{cr}$	Critical rate of rise of on-state current $I_T = I_{TAVm}$, half sine waveform, $f = 50\ Hz$, $V_D = 2/3\ V_{DRM}$, $t_r = 0.3\ µs$, $I_{GT} = 2\ A$		200	A/µs
$(dv_D/dt)_{cr}$	Critical rate of rise of off-state voltage $V_D = 2/3\ V_{DRM}$		1 000	V/µs
P_{GAVm}	Maximum average gate power losses		5	W
I_{FGM}	Peak gate current		10	A
V_{FGM}	Peak gate voltage		12	V
V_{RGM}	Reverse peak gate voltage		10	V
$T_{jmin} - T_{jmax}$	Operating temperature range		-40 ÷ 125	°C
$T_{stgmin} - T_{stgmax}$	Storage temperature range		-40 ÷ 125	°C

Unless otherwise specified $T_j = 125\ °C$

Characteristics			Value			Unit
			min.	typ.	max.	
V_{TM}	**Maximum peak on-state voltage** $I_{TM} = 4\ 000\ A$				1.550	V
V_{T0}	**Threshold voltage**				1.039	V
r_T	**Slope resistance** $I_{T1} = 3\ 350\ A,\ I_{T2} = 10\ 050\ A$				0.127	mΩ
I_{DM}	**Peak off-state current** $V_D = V_{DRM}$				200	mA
I_{RM}	**Peak reverse current** $V_R = V_{RRM}$				200	mA
t_{gd}	**Delay time** $T_j = 25\ °C,\ V_D = 0.4\ V_{DRM},\ I_{TM} = I_{TAVm},$ $t_r = 0.3\ µs,\ I_{GT} = 2\ A$				2	µs
t_q	**Turn-off time** $I_T = 2\ 000\ A,\ di_T/dt = 12.5\ A/µs,$ $V_D = 2/3\ V_{DRM},\ dv_D/dt = 50\ V/µs$			250		µs
Q_{rr}	**Recovery charge** the same conditions as at t_q			3 200		µC
I_H	**Holding current**	$T_j = 25\ °C$ $T_j = 125\ °C$		170 90		mA
I_L	**Latching current**	$T_j = 25\ °C$ $T_j = 125\ °C$		1 500 1 000		mA
V_{GT}	**Gate trigger voltage** $V_D = 12V,\ I_T = 4\ A$	$T_j = -40\ °C$ $T_j = 25\ °C$ $T_j = 125\ °C$	0.25		4 3 2	V
I_{GT}	**Gate trigger current** $V_D = 12V,\ I_T = 4\ A$	$T_j = -40\ °C$ $T_j = 25\ °C$ $T_j = 125\ °C$	10		500 250 150	mA

Unless otherwise specified $T_j = 125\ °C$

Thermal Parameters		Value	Unit
R_{thjc}	**Thermal resistance junction to case** double side cooling	10.0	K/kW
	anode side cooling	16.0	
	cathode side cooling	26.5	
R_{thch}	**Thermal resistance case to heatsink** double side cooling	3.0	K/kW
	single side cooling	6.0	

Transient Thermal Impedance

Analytical function for transient thermal impedance

$$Z_{thjc} = \sum_{i=1}^{5} R_i (1 - \exp(-t/\tau_i))$$

Conditions:

$F_m = 50 \pm 5$ kN, Double side cooled

Correction for periodic waveforms

180° sine:	add 1.0 K/kW
180° rectangular:	add 1.0 K/kW
120° rectangular:	add 1.5 K/kW
60° rectangular:	add 3.0 K/kW

i	1	2	3	4	5
τ_i (s)	0.4871	0.1468	0.0677	0.0079	0.0021
R_i (K/kW)	6.73	1.44	0.65	0.84	0.32
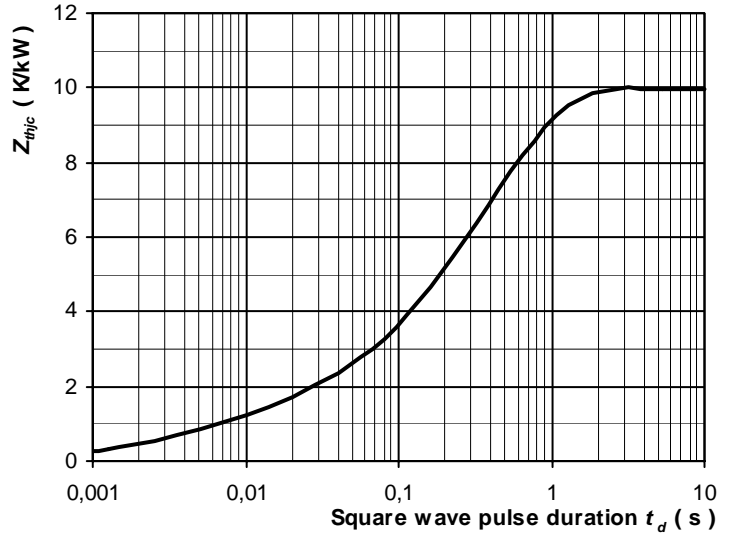
Fig. 2 Dependence transient thermal impedance junction to case on square pulse
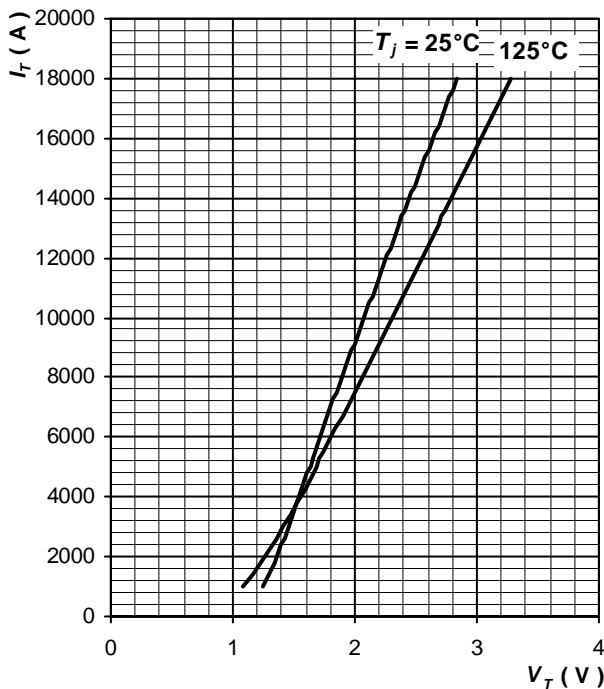
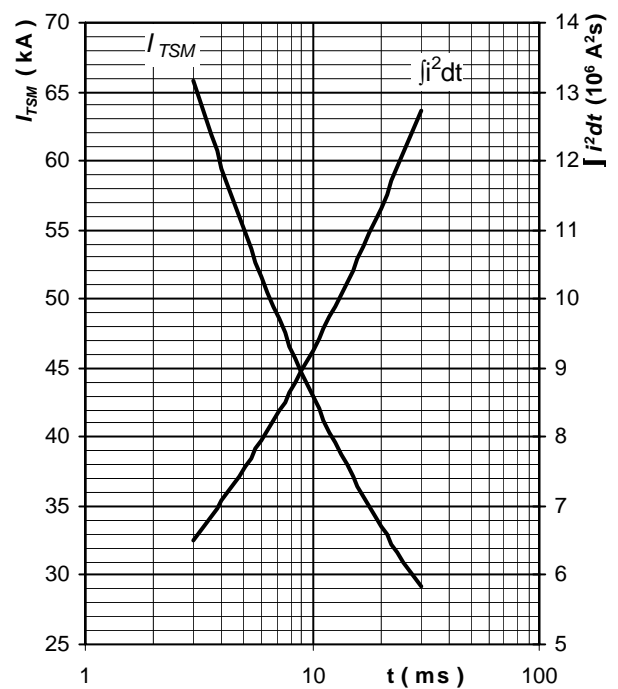Fig. 3 Maximum on-state characteristics

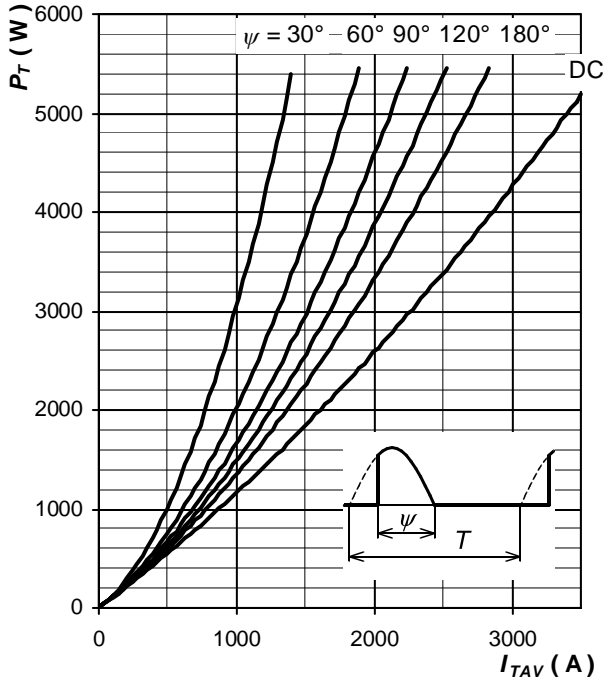Fig. 4 Surge on-state current vs. pulse length, half sine wave, single pulse, $V_R = 0$ V, $T_j = T_{jmax}$

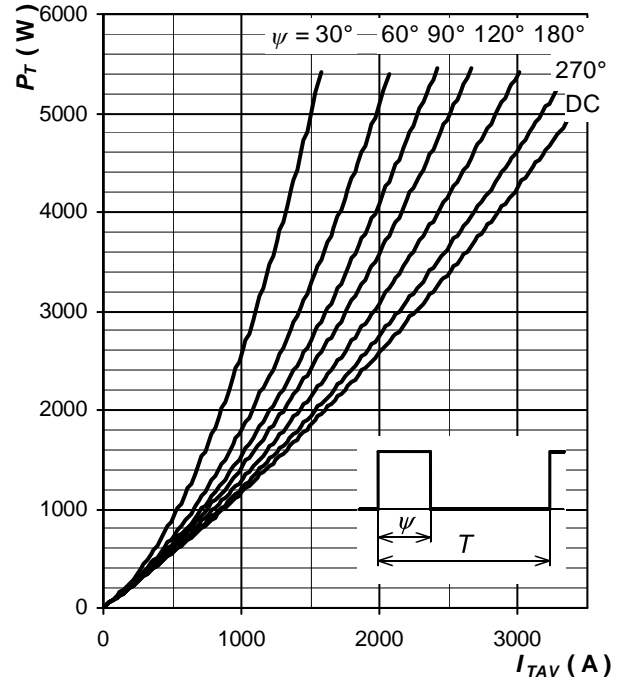Fig. 5 On-state power loss vs. average on-state current, sine waveform, f = 50 Hz, T = 1/f

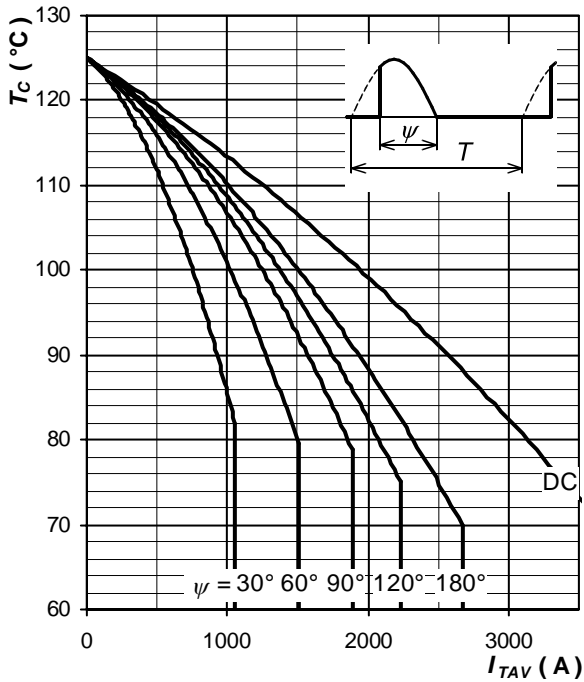Fig. 6 On-state power loss vs. average on-state current, square waveform, f = 50 Hz, T = 1/f

Fig. 7 Max. case temperature vs. aver. on-state current, sine waveform, f = 50 Hz, T = 1/f
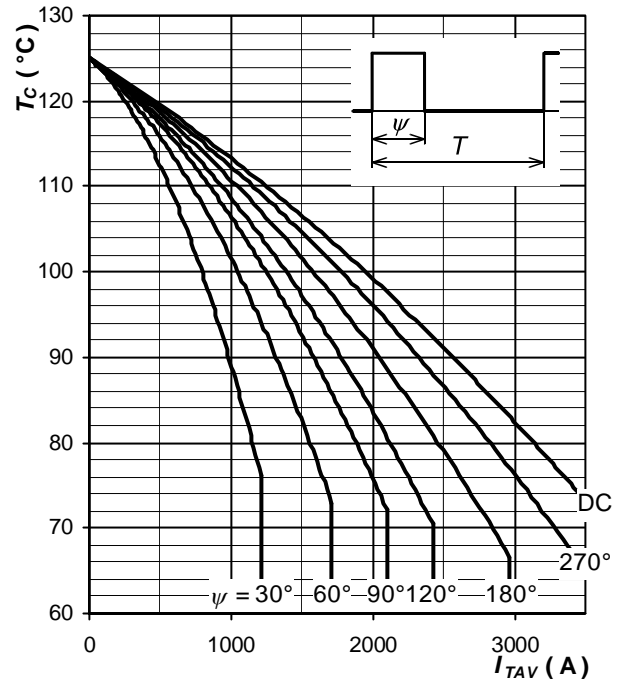

Fig. 8 Max. case temperature vs. aver. on-state current, square waveform, f = 50 Hz, T = 1/f

Notes:

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